What is claimed is:

1. A portable digital camera having no photographic film, comprising:

(a) an integral flash for providing illumination during image acquisition;

(b) a digital image capturing apparatus for acquiring an image; and

(c) a red-eye filter for modifying an area within the image indicative of a red-eye phenomenon based on an analysis of a subsample representation of selected regions of the image.

2. The camera of claim 1, wherein the analysis is performed at least in part for determining said area.

3. The camera of claim 1, wherein the analysis is performed at least in part for determining said modifying.

4. The camera of claim 1, wherein said selected regions of said acquired image comprise the entire image.

5. The camera of claim 1, wherein said selected regions of said acquired image comprise multi resolution encoding of said image.

6. The camera of claim 1, wherein at least one region of the entire image is not included among said selected regions of said image.

7. The camera of claim 1, wherein said analysis is performed in part on a full resolution image and in part on a subsample resolution of said image.

8. The camera of claim 1, further comprising a module for changing the degree of said subsampling.

9. The camera of claim 8, wherein said changing the degree of said subsampling is determined empirically.

10. The camera of claim 8, wherein said changing the degree of said subsampling is determined based on a size of said image.

11. The camera of claim 8, wherein said changing the degree of said subsampling is determined based on a size of selected regions of the image.

12. The camera of claim 8, wherein said changing the degree of said subsampling is determined based on data obtained from the camera relating to the settings of the camera at the time of image capture.

13. The camera of claim 12, wherein the data obtained from the camera includes an aperture setting or focus of the camera, or both.

14. The camera of claim 12, wherein the data obtained from the camera includes the distance of the subject from the camera.

15. The camera of claim 8, wherein said changing the degree of said subsampling is determined based image metadata information.

16. The camera of claim 8, wherein said modifying the area is performed including the full resolution of said image.

17. The camera of claim 8, wherein said red-eye filter comprises of a plurality of sub filters.

18. The camera of claim 17, wherein said subsampling for said sub filters operating on selected regions of said image is determined by one or more of the image size, suspected as red eye region size, filter computation complexity, empirical success rate of said sub filter, empirical false detection rate of said sub filter, falsing probability

of said sub filter, relations between said suspected regions as red eye, results of previous analysis of other said sub filters.

19. The camera of claim 1, further comprising memory for saving said image after applying said filter for modifying pixels as a modified image.

20. The camera of claim 1, further comprising memory for saving said subsample representation of said image.

21. The camera of claim 1, wherein said subsample representation of selected regions of said image is determined in hardware.

22. The camera of claim 1, wherein said analysis is performed in part on the full resolution image and in part on a subsample resolution of said image.

23. The camera of claim 1, further comprising means for changing the degree of said subsampling.

24. The camera of claim 23, wherein said changing the degree of said subsampling is determined empirically.

25. The camera of claim 23, wherein said changing the degree of said subsampling is determined based on a size of said image.

26. The camera of claim 23, wherein said changing the degree of said subsampling is determined based on a region size.

27. The camera of claim 23, wherein said changing the degree of said subsampling is determined based on a complexity of calculation for said filter.

28. The camera of claim 1, wherein said subsample representation is determined using spline interpolation.

29. The camera of claim 1, wherein said subsample representation is determined using bi-cubic interpolation.

30. The camera of claim 1, wherein said modifying the area is performed on the full resolution of said image.

31. The camera of claim 1, wherein said red-eye filter comprises a plurality of sub-filters.

32. The camera according to claim 31, wherein said subsampling for said sub-filters operating on selected regions of said image is determined by one or more of the image size, a suspected red eye region size, filter computation complexity, empirical success rate of said sub-filter, empirical false detection rate of said sub-filter, falsing probability of said sub-filter, relations between said suspected red eye regions, or results of previous analysis of one or more other sub-filters.

33. The camera of claim 1, further comprising:

(d) a pixel locator for locating pixels having a color indicative of the red-eye phenomenon;

(e) a shape analyzer for determining if a grouping of at least a portion of the pixels located by the pixel locator comprise a shape indicative of the red-eye phenomenon; and

(f) a pixel modifier for modifying the color of the pixels within the grouping.

34. The camera of claim 33, further comprising a falsing analyzer for further processing the image in a vicinity of the grouping for details indicative of an eye, and for enabling the pixel modifier in response thereto.

35. The camera of claim 33, further comprising an exposure analyzer for determining if the image was acquired in a condition indicative of the red-eye phenomenon.

36. A portable digital camera having no photographic film, comprising:

(a) an integral flash for providing illumination during image recording;

(b) a digital image capturing apparatus for recording an image; and

(c) a red-eye filter for modifying an area within the image indicative of a red-eye phenomenon based on an analysis of a subsample representation of selected regions of the image.

37. The camera of claim 36, wherein the analysis is performed at least in part for determining said area.

38. The camera of claim 36, wherein the analysis is performed at least in part for determining said modifying.

39. The camera of claim 36, wherein said selected regions of said recorded image comprise the entire image.

40. The camera of claim 36, wherein said selected regions of said recorded image comprise multi resolution encoding of said image.

41. The camera of claim 36, wherein at least one region of the entire image is not included among said selected regions of said image.

42. The camera of claim 36, wherein said analysis is performed in part on a full resolution image and in part on a subsample resolution of said image.

43. The camera of claim 36, further comprising a module for changing the degree of said subsampling.

44. The camera of claim 43, wherein said changing the degree of said subsampling is determined empirically.

45. The camera of claim 43, wherein said changing the degree of said subsampling is determined based on a size of said image.

46. The camera of claim 43, wherein said changing the degree of said subsampling is determined based on a size of selected regions of the image.

47. The camera of claim 43, wherein said changing the degree of said subsampling is determined based on data obtained from the camera relating to the settings of the camera at the time of image capture.

48. The camera of claim 47, wherein the data obtained from the camera includes an aperture setting or focus of the camera, or both.

49. The camera of claim 47, wherein the data obtained from the camera includes the distance of the subject from the camera.

50. The camera of claim 43, wherein said changing the degree of said subsampling is determined based image metadata information.

51. The camera of claim 43, wherein said modifying the area is performed including the full resolution of said image.

52. The camera of claim 43, wherein said red-eye filter comprises of a plurality of sub filters.

53. The camera of claim 52, wherein said subsampling for said sub filters operating on selected regions of said image is determined by one or more of the image size, suspected as red eye region size, filter computation complexity, empirical success rate of said sub filter, empirical false detection rate of said sub filter, falsing probability

of said sub filter, relations between said suspected regions as red eye, results of previous analysis of other said sub filters.

54. The camera of claim 36, further comprising memory for saving said digitized image after applying said filter for modifying pixels as a modified image.

55. The camera of claim 36, further comprising memory for saving said subsample representation of said image.

56. The camera of claim 36, wherein said subsample representation of selected regions of said image is determined in hardware.

57. The camera of claim 36, wherein said analysis is performed in part on the full resolution image and in part on a subsample resolution of said image.

58. The camera of claim 36, further comprising means for changing the degree of said subsampling.

59. The camera of claim 58, wherein said changing the degree of said subsampling is determined empirically.

60. The camera of claim 58, wherein said changing the degree of said subsampling is determined based on a size of said image.

61. The camera of claim 58, wherein said changing the degree of said subsampling is determined based on a region size.

62. The camera of claim 58, wherein said changing the degree of said subsampling is determined based on a complexity of calculation for said filter.

63. The camera of claim 36, wherein said subsample representation is determined using spline interpolation.

64. The camera of claim 36, wherein said subsample representation is determined using bi-cubic interpolation.

65. The camera of claim 36, wherein said modifying the area is performed on the full resolution of said image.

66. The camera of claim 36, wherein said red-eye filter comprises a plurality of sub-filters.

67. The camera of claim 66, wherein said subsampling for said sub-filters operating on selected regions of said image is determined by one or more of the image size, a suspected red eye region size, filter computation complexity, empirical success rate of said sub-filter, empirical false detection rate of said sub-filter, falsing probability of said sub-filter, relations between said suspected red eye regions, or results of previous analysis of one or more other sub-filters.

68. The camera of claim 36, further comprising:

(d) a pixel locator for locating pixels having a color indicative of the red-eye phenomenon;

(e) a shape analyzer for determining if a grouping of at least a portion of the pixels located by the pixel locator comprise a shape indicative of the red-eye phenomenon; and

(f) a pixel modifier for modifying the color of the pixels within the grouping.

69. The camera of claim 68, further comprising a falsing analyzer for further processing the image in a vicinity of the grouping for details indicative of an eye, and for enabling the pixel modifier in response thereto.

70. The camera of claim 68, further comprising an exposure analyzer for determining if the image was recorded in a condition indicative of the red-eye phenomenon.

71. A portable digital camera having no photographic film, comprising:

(a) an integral flash for providing illumination during image acquisition;

(b) a digital image capturing apparatus for acquiring an image; and

(c) an image store for holding:

(i) a temporary copy of an unprocessed image known as a pre-capture image;

(ii) a permanent copy of a digitally processed, captured image, and

(iii) a subsample representation of selected regions of the pre-capture image; and

(d) a red-eye filter for modifying an area within said at least one of the images indicative of a red-eye phenomenon based on an analysis of the subsample representation.

72. The camera of claim 71, wherein said at least one of the images comprises the digitally processed, captured image.

73. The camera of claim 72, wherein said subsample representation of selected regions of said image is determined in hardware.

74. The camera of claim 72, wherein said analysis is performed in part on the full resolution image and in part on a subsample resolution of said image.

75. The camera of claim 72, further comprising a module for changing the degree of said subsampling.

76. The camera of claim 75, wherein said changing the degree of said subsampling is determined empirically.

77. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on a size of said image.

78. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on a region size.

79. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on a complexity of calculation for said red eye filter.

80. The camera of claim 75, wherein said subsample representation is determined using a spline interpolation.

81. The camera of claim 75, wherein said subsample representation is determined using bi-cubic interpolation.

82. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on data obtained from the camera relating to the settings of the camera at the time of image acquisition.

83. The camera of claim 82, wherein the data obtained from the camera includes an aperture setting or focus of the camera, or both.

84. The camera of claim 82, wherein the data obtained from the camera includes the distance of the subject from the camera.

85. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on data obtained from the camera relating to image processing analysis of said precapture images.

86. The camera of claim 85, wherein said image processing analysis is based on histogram data obtained from said pre-capture image.

87. The camera of claim 85, wherein said image processing analysis is based on color correlogram data obtained from said pre-capture image.

88. The camera of claim 85, wherein said image processing analysis is based on global luminance or white balance image data, or both, obtained from said pre-capture image.

89. The camera of claim 85, wherein said image processing analysis is based on face detection analysis of said pre-capture image.

90. The camera of claim 85, wherein said image processing analysis is based on determining pixel regions with a color characteristic indicative of redeye.

91. The camera of claim 85, wherein said image processing analysis is performed in hardware.

92. The camera of claim 75, wherein said changing the degree of said subsampling is determined based on image metadata information.

93. The camera of claim 72, wherein said modifying the area is performed including the full resolution of said image.

94. The camera of claim 72, wherein said red-eye filter comprises a plurality of sub filters.

95. The camera of claim 71, further comprising:

(d) a pixel locator for locating pixels having a color indicative of the red-eye phenomenon;

(e) a shape analyzer for determining if a grouping of at least a portion of the pixels located by the pixel locator comprise a shape indicative of the red-eye phenomenon; and

(f) a pixel modifier for modifying the color of the pixels within the grouping.

96. The camera of claim 95, further comprising a falsing analyzer for further processing the image in a vicinity of the grouping for details indicative of an eye, and for enabling the pixel modifier in response thereto.

97. The camera of claim 95, further comprising an exposure analyzer for determining if the image was acquired in a condition indicative of the red-eye phenomenon.

98. A method of filtering a red eye phenomenon from an acquired digital image comprising a multiplicity of pixels indicative of color, the method comprising:

(a) providing illumination during image acquisition;

(b) acquiring a digital image; and

(c) determining whether one or more regions within a subsample representation of said acquired digital image are suspected as including red eye artifact.

99. The method of claim 98, further comprising varying a degree of the subsample representation for each region of said one or more regions based on said image.

100. The method of claim 98, further comprising generating the subsample representation based on said image.

101. The method of claim 98, further comprising generating the subsample presentation utilizing a hardware-implemented subsampling engine.

102. The method of claim 98, further comprising testing one or more regions within said subsample representation determined as including red eye artifact for determining any false redeye groupings.

103. The method of claim 98, further comprising;

(d) associating said one or more regions within said subsample presentation of said image with one or more corresponding regions within said image; and

(e) modifying said one or more corresponding regions within said image.

104. The method of claim 98, wherein the determining comprises analyzing meta-data information including image acquisition device-specific information.

105. The method of claim 98, further comprising analyzing the subsample representation of selected regions of said digitized image, and modifying an area determined to include red eye artifact.

106. The method of claim 105, wherein the analysis is performed at least in part for determining said area.

107. The method of claim 105, wherein the analysis is performed at least in part for determining said modifying.

108. The method of claim 105, wherein said selected regions of said digitized image comprise the entire image.

109. The method of claim 105, wherein said selected regions of said digitized image comprise multi resolution encoding of said image.

110. The method of claim 105, wherein at least one region of the entire image is not included among said selected regions of said image.

111. The method of claim 105, wherein said analysizing is performed in part on a full resolution image and in part on a subsample resolution of said image.

112. The method of claim 105, further comprising changing the degree of said subsampling.

113. The method of claim 112, wherein said changing the degree of said subsampling is determined empirically.

114. The method of claim 112, wherein said changing the degree of said subsampling is determined based on a size of said image.

115. The method of claim 112, wherein said changing the degree of said subsampling is determined based on a size of selected regions.

116. The method of claim 105, further comprising saving said digitized image after applying said filter for modifying pixels as a modified image.

117. The method of claim 105, further comprising saving said subsample representation of said image.

118. The method of claim 105, further comprising determining said subsample representation of said image in hardware.

119. The method of claim 105, further comprising determining said subsample representation using spline interpolation.

120. The method of claim 105, further comprising determining said subsample representation using bi-cubic interpolation.

121. The method of claim 105, wherein said modifying of the area is performed including the full resolution of said image.

122. The method of claim 98, further comprising determining said subsample representation utilizing a plurality of sub-filters.

123. The method of claim 122, wherein said subsampling for said sub-filters operating on selected regions of said image is determined by one or more of the image

size, a suspected red eye region size, filter computation complexity, empirical success rate of said sub-filter, empirical false detection rate of said sub-filter, falsing probability of said sub-filter, relations between said suspected red eye regions, or results of previous analysis of one or more other sub-filters.

124. The method of claim 98, further comprising:

(d) locating pixels having a color indicative of the red-eye phenomenon;

(e) determining if a grouping of at least a portion of the located pixels comprise a shape indicative of the red-eye phenomenon; and

(f) modifying the color of the pixels within the grouping.

125. The method of claim 124, further comprising processing the image in a vicinity of the grouping for details indicative of an eye, and enabling the pixel modifier in response thereto.

126. The method of claim 124, further comprising determining if the image was acquired and/or recorded in a condition indicative of the red-eye phenomenon.

~~I claim:~~

~~1. Within a portable digital camera having no photographic film, a method of filtering a red-eye phenomenon from a digital image comprising a multiplicity of pixels indicative of color, the pixels forming various shapes of the image, the method comprising the steps of:~~

~~locating pixels having a color indicative of the red-eye phenomenon;~~

~~determining if a grouping of at least a portion of the pixels of said step locating comprise a shape indicative of the red-eye phenomenon;~~

~~modifying the color of the grouping in response to said step of determining; and~~

~~analyzing if conditions of recording of the image are indicative of the red-eye phenomenon, wherein said step of modifying is selectively performed in response thereto.~~

~~2. The method according to claim 1 wherein the color indicative of the red-eye~~

~~phenomenon corresponds to a substantially red color, and the shape indicative of the red-eye phenomenon corresponds to a substantially round, semi-circular or oval shape.~~

~~3. The method according to claim 1 wherein said step of analyzing includes determining if a flash was used in conjunction with the recording of the image.~~

~~4. The method according to claim 1 wherein said step of analyzing includes determining if a flash was used in conjunction with the recording of the image, the distance between a subject of the image and a camera for recording the image and an ambient light level during the recording of the image.~~

~~5. The method according to claim 1 wherein said step of modifying changes the color of the grouping to black.~~

~~6. The method according to claim 1 wherein said step of determining further comprises the steps of:~~

~~determining if pixels in a vicinity of the grouping have a feature indicative an eye;~~

~~and inhibiting said step of modifying in response to an absence of the feature.~~

~~7. The method according to claim 6 wherein the feature includes an absence of additional pixels having a color indicative of the red-eye phenomenon within the vicinity of the grouping.~~

~~8. The method according to claim 6 wherein the feature includes a substantially white area within the vicinity of the grouping.~~

~~9. The method according to claim 1 wherein the portable digital camera includes an integral flash and an electronic display, said method further comprising the steps of:~~

~~initiating a photographic flash by the flash;~~

~~digitally recording the image in response to said step of initiating;~~

~~performing said steps of locating, determining and modifying in response to said step of recording; and~~

~~displaying the image in response to said step of modifying on the electronic display.~~

~~10. A portable digital camera having no photographic film comprising:~~

~~an integral flash for providing illumination during image recording;~~

~~a digital image capturing apparatus for recording an image; and~~

~~a red-eye filter for modifying an area within the image indicative of a red-eye phenomenon.~~

~~11. The camera according to claim 10 further comprising an integral image display for displaying the modified image.~~

~~12. The camera according to claim 10 wherein the area has a color and shape indicative of the red-eye phenomenon and the image is modified to change the color to a black color and further wherein:~~

~~said integral flash selectively provides illumination during image recording; and~~

~~said red-eye filter is enabled to modify the image in response to said integral flash providing illumination during image recording.~~

~~13. The camera according to claim 12 further comprising an exposure control means for determining if the image was recorded in a condition conducive to the red-eye phenomenon and for generating a red-eye signal in response thereto, wherein said red-eye filter is further enabled in response to the red-eye signal.~~

~~14. The device according to claim 10 wherein said red-eye filter further includes a falsing avoidance apparatus which enables modification of the area in response to an absence of color indicative of the red-eye phenomenon with in a vicinity of and exclusive to the area.~~

~~15. The device according to claim 10 wherein said red-eye filter further includes a falsing avoidance apparatus which enables modification of the area in response a substantially white colored region within a vicinity of the area.~~

~~16. The device according to claim 10 wherein said red-eye filter comprises:~~

~~a pixel locator for locating pixels having a color indicative of the red-eye phenomenon;~~

~~a shape analyzer for determining if a grouping of at least a portion of the pixels located by said pixel locator comprise a shape indicative of the red-eye phenomenon; and~~

~~a pixel modifier for modifying the color of the pixels within the grouping.~~

~~17. The red-eye filter according to claim 16 further comprising a falsing analyzer for further processing the image in a vicinity of the grouping for details indicative of an eye, and for enabling said pixel modifier in response thereto.~~

~~18. The red-eye filter according to claim 16 further comprising an exposure analyzer for determining if the image was recorded in a condition indicative of the red-eye phenomenon.~~